

TOWNSEND and TOWNSEND and CREW LLP

By:

Valerie Peterson

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:

Herb H. Huang et al.

Application No.: 10/773,522

Filed: February 6, 2004

For: SEMICONDUCTOR MEMORY CELL
WITH BURIED DOPANT BIT LINES AND
SALICIDED POLYSILICON WORD LINES
ISOLATED BY AN ARRAY OF BLOCKS

Customer No. 20350

Mail Stop Appeal Brief

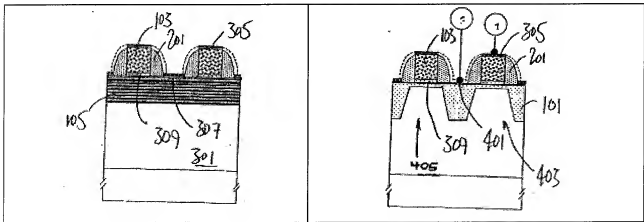
Commissioner for Patents

P.O. Box 1450, Alexandria, VA 22313-1450

Sir:

This Reply Brief is filed in response to the Examiner's Answer mailed May 14, 2008.

Figures 3 and 4 (reproduced respectively below) are different cross-sectional views showing use of silicidation in combination with trench isolation, by the claimed embodiments:



In particular, these views show application of a refractory metal layer (305) over an exposed portion of that trench isolation structure (101), such that the refractory metal over the trench is separated from an adjacent gate by a gate spacer (201).

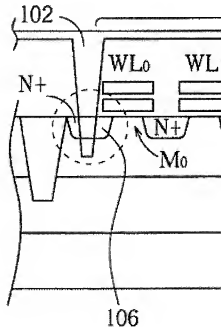
Claim 1 accordingly recites:

1. A method for manufacturing ROM memory devices, the method comprising:
forming a trench isolation structure within a cell region of a semiconductor substrate, the cell region being in an array region for ROM memory devices, the trench isolation structure being provided to separate a continuous bit line region of the cell from another continuous bit line region from another cell;
... applying a refractory metal layer overlying the gate structure including the first side wall spacer and the second sidewall spacer and exposed portion of the trench isolation structure. ... (Emphasis added)

All claims stand rejected based upon the combination of U.S. Patent 6,372,580 to Shiau ("the Shiau Patent") in view of U.S. Patent 6,847,087 to Yang et al. ("the Yang Patent").

The Shiau Patent, however, fails to teach formation of a trench isolation structure within a cell. To provide this teaching, the Examiner has combined that reference with the Yang Patent.

Fig. 2(a) (reproduced in part below) of the Yang Patent does show trench isolation.



However, the Yang Patent lacks any teaching to form silicide.

Moreover, this lack of teaching in the Yang patent is not surprising, given there would be no need to form silicide over the drain regions:

contact plug 102 is electrically connected with a drain 106 of the NMOS memory transistor M₀ of the NAND cell block B₁. As specifically indicated in the circle regions of FIG 2(a), the contact plug 102 penetrates a junction of the drain 106

and the underlying buried bit line SPW₁, thereby short-circuiting the drain 106 and the subjacent buried bit line SPW₁. (Emphasis added, col. 5, lines 11-15)

This architecture stands in marked contrast with the Shiau Patent, whose object is development of a silicide layer to reduce the electrical resistance in the bit lines. (See col. 5, lines 17-21) Specifically, the silicide layer of the Shiau Patent is used to decrease electrical resistance of the drain and bit line region, while the contact plug of the Yang Patent is electrically coupled to short-circuit this region. In view of this conflicting function, use of the contact plug of the Yang Patent is inconsistent with the expressed objective of the Shiau Patent.

Based at least upon this key difference (present at a point of novelty of the claimed embodiments), one of ordinary skill in the art would hardly have been motivated to combine these Shiau and Yang Patent references to arrive at the claimed invention.

Of course, the instant application contains substantial disclosure regarding formation of a trench isolation structure and application of a refractory metal layer over an exposed portion of the trench isolation structure. However, In particular, the Federal Circuit has cautioned against the "insidious" danger posed by the use of hindsight reasoning in attempting to establish obviousness:

the very ease with which the invention can be understood may prompt one "to fall victim to the insidious effect of a hindsight syndrome wherein that which only the inventor taught is used against its teacher." Emphasis added; In re Dembiczak, 50 U.S.P.Q.2d, 1614, 1617 (Fed.Cir. 1999), citing W.L. Gore & Assoc., Inc. v. Garlock, Inc. 721 F.2d 1540, 1553 (Fed.Cir. 1983)

Here, given the incongruity of the Shiau and Yang Patents in the area of trench isolation and silicidation, it is respectfully asserted that these references fail to provide reasonable motivation for their combination. Accordingly, Appellants respectfully maintain traversal of the outstanding claim rejections, and assert that the obviousness claim rejections should be overturned by the Board.

Respectfully submitted,



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